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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/724,269	11/28/2000	Simon Kasif	0918.2033-000 (P00-3373)	7893

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IP Administration  
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EXAMINER

ZEMAN, MARY K

ART UNIT

PAPER NUMBER

1631

DATE MAILED: 05/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/724,269

Applicant(s)

KASIF ET AL.

Examiner

Mary K Zeman

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 December 2002 and 31 January 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-14 and 16-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-14, 16-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 31 January 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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### **DETAILED ACTION**

The Art Unit location of your application in the USPTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Art Unit 1631, Examiner Mary K Zeman.

Claims 1-5, 7-14 and 16-20 are pending in this application. Claims 19 and 20 are newly added. Claims 6 and 15 have been canceled.

Applicant's arguments filed 12/30/02 have been fully considered but they are not completely persuasive. Any rejection not reiterated below has been withdrawn.

### ***Drawings***

The proposed correction and substitute drawing of Figure 3 were received on 1/31/03. These drawings are acceptable to the examiner, and they resolve the issue regarding sequence compliance. The biological-type sequences in the figures have been removed, obviating the need to comply with the sequence rules.

### ***Rejections Maintained***

#### ***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-5, 7-9 and 19 remain rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims are drawn to methods of manipulating data which do not produce a concrete, tangible and useful result. The provided "formed vector" that is generated by claim 1 and claim 19, on its own, is not a concrete tangible and useful result, as required. This result ("formed vector") must be further manipulated and worked upon to provide a concrete tangible and useful result. As set forth in MPEP 2106: "For such subject matter to be statutory, the claimed process must be limited to a practical application of the abstract idea or mathematical algorithm in the technological arts. See *Alappat*, 33 F.3d at 1543, 31 USPQ2d at 1556-57 (quoting *Diamond v. Diehr*, 450 U.S. at 192, 209 USPQ at 10). See

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also Alappat 33 F.3d at 1569, 31 USPQ2d at 1578-79 (Newman, J., concurring) ("unpatentability of the principle does not defeat patentability of its practical applications") (citing O 'Reilly v. Morse, 56 U.S. (15 How.) at 114-19). A claim is limited to a practical application when the method, as claimed, produces a concrete, tangible and useful result; i.e., the method recites a step or act of producing something that is concrete, tangible and useful. See AT &T, 172 F.3d at 1358, 50 USPQ2d at 1452. Likewise, a machine claim is statutory when the machine, as claimed, produces a concrete, tangible and useful result (as in State Street, 149 F.3d at 1373, 47 USPQ2d at 1601) and/or when a specific machine is being claimed (as in Alappat, 33 F.3d at 1544, 31 USPQ2d at 1557 (in banc))."

Applicant's arguments in regard to the statutory rejections of record in the previous action have been carefully reviewed, however, the steps of the rejected method claims fail to generate data that meet the standard of concrete, tangible and useful. With regards to the apparatus claims, the rejection is no longer applied to those claims, as the apparatus claims clearly describe statutory subject matter. As this grounds of rejection is slightly different in focus from that which was previously pending, this action will be *non-final*.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-5, 7-14, 16-20 remain rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Applicant argues that as the very nature of the invention is prophetic, that the disclosure is not required to set forth each and every parameter or likely application. Applicant sets forth that the set of known biological fragments to be used is a database which contains protein sequences that are annotated. The claims do not recite the need for such an annotated database, and the specification fails to provide other types of sets of biological fragments that can be used

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in the claimed methods. Applicant further argues that the specification provides detail as to how to obtain a comparison database. It is noted that the independent claims do not require a comparison database such that this argument is persuasive. It would appear from Applicant's arguments that the annotated databases of protein sequences are a critical element that is missing from all the claims. The vague and prophetic statement in the specification that one could use other protein databases "which has been labeled according to some parameter" is not a sufficient explanation of what parameters must be annotated and what information must be provided in order to perform the methods as set forth in the claims. With regards to the apparatus claims, it would appear that significant database information is lacking from the claims, as well as how the processor acts on that information to provide some result is lacking. Therefore, for the reasons set forth previously, and the reasons set forth above, the methods and apparatus of the claims would require undue experimentation by one of skill in the art to practice.

***New Grounds of Rejection***  
***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 7, 8, 10-14 and 16-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Akutsu (1994).

The claims are drawn to methods of analyzing sequences or genomes, through the generation of feature vectors from a fixed set of biological fragments. The fragments can be from published databases, be proteins, or DNA, or comprise motifs.

Akutsu (Akutsu, T. Substructure Search and Alignment Algorithms for Three dimensional Protein Structures. *Joho Shori Gakkai Kenkyu Hokoku*, (1994) vol. 94, no. 82(AL.41), pp. 1.8.) discloses methods of generating hash vectors from a fixed set of biological fragments from a protein structure or structure database. These hash vectors are manipulated as to the number of occurrences, relatedness to other sequences etc. This appears to meet the

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limitations of claim 1. The sequences of Akustu are specifically protein sequences derived from DNA sequences, and are available in published databases. Akutsu specifically discloses software and computer systems which perform the methods, and meet the limitations of the apparatus claims.

Claims 1-5, 7, 8, 10-14 and 16-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Akutsu et al. (1997).

Akutsu et al. (Akutsu et al. Rapid protein fragment search using hash functions based on the fourier transform. CABIOS (1997) Vol. 13: 4 pages 357-364) disclose a variation of the 1994 paper utilizing hash vectors from fixed length fragments from biological sequences. These methods were used on protein data bank data, which is a published database which comprises protein sequences, DNA information, annotation as to structure, function, motifs, etc. These hash vectors are manipulated as to the number of occurrences, relatedness to other sequences etc. This appears to meet the limitations of claim 1. This paper also discloses software and computer systems which meet the limitations of the apparatus claims.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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Claims 1-5, 7-14 and 16-20 are rejected under 103(a) as being unpatentable over Berry et al. (1999).

Berry et al. (Berry et al. (April 23, 1999) SIAM Rev. 41:2 335-362) teach the application of vector spaces, the formation of vectors, and uniform length representations to text strings, databases, and digital libraries. Berry et al. appear to disclose the same mathematic concepts as the invention, and teach the application of the concepts to words, text documents etc all in digital databases. These are the steps required by the rejected claims.

The difference between the prior art and the claimed invention is the nature of the text information. Berry et al. do not specifically speak to protein sequences or genome sequences. However, protein sequences are stored generally as text documents with a one letter or three letter code representing their sequence, which is highly akin to text documents. Further the annotation present in protein databases are text documents and comprise words. Finally, Berry et al. specifically reference the use of their model on the MEDLINE database (p360), which comprises (among other things) papers about proteins and genomes and their sequences. This would appear to meet the published database limitation. This protein sequence information or genome sequence information is descriptive information stored on or employed by a machine. This information is fed into a known algorithm whose purpose is to compare or modify those data using a series of processing steps that do not impose a change on the processing steps and are thus nonfunctional descriptive material. Neither the specification, nor the claims set forth any special, non-obvious modifications to the known, algorithm, software and method steps. A method of using a known method (e.g. utilizing feature vectors to compare text strings known in the prior art to Berry, including commercially available software for implementation of such computations) for its known purpose to compare data sets does not become non-obvious merely because new data becomes available for analysis. Nonfunctional descriptive material cannot render non-obvious an invention that would have otherwise been obvious. See *In re Gulack*, 703 F.2d 1381, 1385 (Fed. Cir. 1983) and MPEP 2106. Applicant is also directed to the Trilateral Project WM4 Report on Comparative Study on Protein 3-Dimensional (3-D) Structure Related Claims at: [http://www.uspto.gov/web/tws/wm4/wm4\\_index.htm](http://www.uspto.gov/web/tws/wm4/wm4_index.htm)

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The apparatus claims also appear to be obvious over those disclosed by Berry, as the nonfunctional descriptive material does not render the known software systems and computer apparatus comprising it non-obvious.

### ***Conclusion***

No claim is allowed.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Stuart et al. (A comprehensive vertebrate phylogeny using vector representations of protein sequences from whole genomes. *Molecular Biology and Evolution* April 2002, Vol 19 :4 554-562.) published after the filing date of the application appears to teach the same methods as the invention.

Stuart et al. (Integrated gene and species phylogenies from unaligned whole genome protein sequences. *Bioinformatics*. (January 2002) Vol. 18 (1) pages 100-108) published after the filing date of the application appears to teach the same methods as the invention.

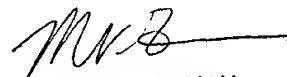
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary K Zeman whose telephone number is (703) 305-7133.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Woodward, can be reached at (703) 308-4028.

Official fax numbers for this Art Unit are: (703) 308-4242, (703) 872-9306. An *unofficial* fax number, direct to the Examiner is (703) 746 5279. Please call prior to use of this number.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC1600 Receptionist whose telephone number is (703) 308-0196.

mkz  
4/30/03

  
MARY K. ZEMAN  
PRIMARY EXAMINER  
